

### SRI LANKA INSTITUTE OF ADVANCED TECHNOLOGICAL EDUCATION

(Established in the Ministry of Higher Education, vide in Act No. 29 of 1995)

# Higher National Diploma in Technology (Agriculture) Second Year, Second Semester Examination – 2015 AG2211 - Field Experimentation and Design

Instructions for Candidates:		
Answer all questions in part I & two questions out of 3 in Part II.		
All questions do not carry equal marks		
Use given F and T tables		
Calculators are allowed to use		
calculators are allowed to use	No. of questions	s · 05
	No. of pages	
	Time	: 1 ½ hrs
Index Number		. 1 , 2 1115
Part I		
1 41 7 1		
Q1. (Total marks 20)		
i. Write four (04) reasons for the importance of field experimentation	on	(04 marks)
	• • • • • • • • • • • • • • • • • • • •	• • • • • • • • • • • • • • • • • • • •
ii. Write four methods of minimizing variance		(04 marks)
		•••••
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	lefinition for the random error in experiments		(06 ma
			• • • • • • • • • • • • • • • • • • • •
atal r	marks 20)		
otai i			
		designs	s (CRD)
	Write 02 (two) disadvantages of completely randomized	designs	s (CRD) ( <b>04 ma</b>
i.		_	(04 ma
i.	Write 02 (two) disadvantages of completely randomized		(04 ma
i.	Write 02 (two) disadvantages of completely randomized		(04 ma
i. 1 2	Write 02 (two) disadvantages of completely randomized		(04 ma
i.	Write 02 (two) disadvantages of completely randomized		(04 ma
i. 1 2	Write 02 (two) disadvantages of completely randomized and a researcher has done an experiment and obtained the following		(04 ma
i. 1 2	Write 02 (two) disadvantages of completely randomized and A researcher has done an experiment and obtained the following the given ANOVA table.    Source of   Degree of   Sum of   Mean   Completely randomized and provided the following the given ANOVA table.	llowing	(04 ma
i. 1 2	Write 02 (two) disadvantages of completely randomized and A researcher has done an experiment and obtained the following the given ANOVA table.  Source of variation Degree of Sum of squares Completely randomized and completely	llowing	(04 ma
i. 1 2	Write 02 (two) disadvantages of completely randomized A researcher has done an experiment and obtained the following the given ANOVA table.  Source of variation Degree of squares Square Completely randomized Answer the Questions using the given ANOVA table.	llowing	ANOVA

c. Briefly interpret the results.	(06 marks)
d. If the grand mean is given as 33.41. Find the coeffic	rient of variation
d. If the grand mean is given as 33.41. I had the coeffic	(06 marks)
Part II	
Answer 02 questions only.	
Q1. (Total 30 marks)	
i. Name one (01) multiple factor experiment.	(03 marks)
ii. What do you mean by explained variation.	(06 marks)
iii. What are the disadvantages of RCBD design in field experime	ents? (06 marks)
iv. Carefully observe the following sources of variations of a field	d experiment.
Write the answers for the questions given below.	
Sources of variation	
Replication	
Treatments	
A B	
A x B Error	
Total	

- a. Identify and name the type of design.
- b. Identify and name the main factors?
- c. Name the interaction.

**(06 marks)** 

- v. A research was conducted using five varieties of tomato named A,B,C,D and E under field condition with soil fertility gradient and moisture gradient in opposite directions. Researcher used five replications per variety.
  - a. Select a suitable design for the research
  - b. Write the degrees of freedom for each source
  - c. Draw the correct design with the two gradients that the researcher is going to apply in the field. (09 marks)

### **Q2.** . (Total 30 marks)

i. What do you mean by accuracy and precision

**(10 marks)** 

ii. The following data is given for an experiment conducted for four treatments in RCBD design with four replicates.

Treatments	Blocks	S		Treatment			
	R1	R2	R3	R4	Treatment	Treatment	
					total	mean	
T1	47	52	62	51	212	53	
T2	50	54	67	57	228	57	
Т3	57	53	69	57	236	59	
T4	54	65	74	59	252	63	
Block total	208	224	272	224	Grand		
					total=928		
Block mean	52	56	68	56		Grand	
						mean=58	

Perform the ANOVA table and interpret your results. Total sum of square is given as 854.

**(20 marks)** 

## **Q3.** . (Total 30 marks)

i. State the steps in field experimentation

**(04 marks)** 

ii. What do you mean by coefficient of variation

**(05 marks)** 

iii. Briefly explain the types of field experiments.

**(06 marks)** 

iv. Following treatment means are given for an agricultural search. Using LSD mean separation procedure, find which treatments are significantly different from the control at 5% significant level. Use following information to find the LSD value.

**(15 marks)** 

Number of replicates= 4

Error degrees of freedom=15

Standard error of mean difference is given (SD)= 3.34

T1=37, T2= 34, T3= 32, T4=28 (control)

# F Distribution 5% Points

# Student's t Distribution

Denominator Numerator (2-tailed probability)

1         161.45         199.5         215.71         224.58         230.16         233.99         236.77         1         1.376         12.706         63.0         2         1.851         19.00         19.16         19.25         19.30         19.33         19.36         2         1.061         4.303         9.8               3             10.13             9.55             9.28             9.12             9.01             8.94             8.89             3             0.978             3.182             5.8               4             7.71             6.94             6.59             6.39             6.26             6.16             6.08             4             0.941             2.776             4.6               5             6.61             5.79             5.41             5.19             5.05             4.95             5.88             5             0.920             2.571             4.6               6             5.99             5.14             4.76             4.53             4.39             4.28             4.21               7             5.59             4.74             4.35             4.13             3.93             3.58             3.50             8             <	df	1	2	3	4	5	6	7	df	0.40	0.05	0.01
2       18.51       19.00       19.16       19.25       19.30       19.33       19.36       2       1.061       4.303       9.5         3       10.13       9.55       9.28       9.12       9.01       8.94       8.89       3       0.978       3.182       5.8         4       7.71       6.94       6.59       6.39       6.26       6.16       6.08       4       0.941       2.776       4.6         5       6.61       5.79       5.41       5.19       5.05       4.95       5.88       5       0.920       2.571       4.6         6       5.99       5.14       4.76       4.53       4.39       4.28       4.21       6       0.906       2.447       3.7         7       5.59       4.74       4.35       4.12       3.97       3.87       3.79       7       0.896       2.365       3.2         8       5.32       4.46       4.07       3.84       3.69       3.58       3.50       8       0.889       2.306       3.3         9       5.12       4.26       3.86       3.63       3.48       3.32       3.23       3.13       10       0.879       2.228	-											63.667
3         10.13         9.55         9.28         9.12         9.01         8.94         8.89         3         0.978         3.182         5.8           4         7.71         6.94         6.59         6.39         6.26         6.16         6.08         4         0.941         2.776         4.6           5         6.61         5.79         5.41         5.19         5.05         4.95         5.88         5         0.920         2.571         4.6           6         5.99         5.14         4.76         4.53         4.39         4.28         4.21         6         0.906         2.447         3.7           7         5.59         4.74         4.35         4.12         3.97         3.87         3.79         7         0.896         2.365         3.4           8         5.32         4.46         4.07         3.84         3.69         3.58         3.50         8         0.889         2.366         3.2           9         5.12         4.26         3.86         3.63         3.48         3.37         3.29         9         0.883         2.262         3.2           10         4.96         4.10         3.71												9.925
4       7.71       6.94       6.59       6.39       6.26       6.16       6.08       4       0.941       2.776       4.6         5       6.61       5.79       5.41       5.19       5.05       4.95       5.88       5       0.920       2.571       4.0         6       5.99       5.14       4.76       4.53       4.39       4.28       4.21       6       0.906       2.447       3.7         7       5.59       4.74       4.35       4.12       3.97       3.87       3.79       7       0.896       2.365       3.2         8       5.32       4.46       4.07       3.84       3.69       3.58       3.50       8       0.889       2.306       3.3         9       5.12       4.26       3.86       3.63       3.48       3.37       3.29       9       0.883       2.262       3.2         10       4.96       4.10       3.71       3.48       3.32       3.22       3.13       10       0.879       2.228       3.3         11       4.84       3.98       3.59       3.36       3.20       3.09       3.01       11       0.876       2.201       3.1 <td></td>												
5         6.61         5.79         5.41         5.19         5.05         4.95         5.88         5         0.920         2.571         4.0           6         5.99         5.14         4.76         4.53         4.39         4.28         4.21         6         0.906         2.447         3.7           7         5.59         4.74         4.35         4.12         3.97         3.87         3.79         7         0.896         2.365         3.4           8         5.32         4.46         4.07         3.84         3.69         3.58         3.50         8         0.889         2.306         3.2           10         4.96         4.10         3.71         3.48         3.32         3.22         3.13         10         0.879         2.228         3.1           11         4.84         3.98         3.59         3.36         3.20         3.09         3.01         11         0.876         2.201         3.1           12         4.75         3.88         3.49         3.26         3.10         3.00         2.91         12         0.873         2.179         3.0           13         4.67         3.80         3.41 <td></td> <td>5.841</td>												5.841
6         5.99         5.14         4.76         4.53         4.39         4.28         4.21         6         0.906         2.447         3.7           7         5.59         4.74         4.35         4.12         3.97         3.87         3.79         7         0.896         2.365         3.4           8         5.32         4.46         4.07         3.84         3.69         3.58         3.50         8         0.889         2.306         3.2           10         4.96         4.10         3.71         3.48         3.32         3.22         3.13         10         0.879         2.228         3.1           11         4.84         3.98         3.59         3.36         3.20         3.09         3.01         11         0.879         2.228         3.1           12         4.75         3.88         3.49         3.26         3.10         3.00         2.91         12         0.873         2.179         3.6           13         4.67         3.80         3.41         3.18         3.02         2.92         2.83         13         0.870         2.160         3.6           14         4.60         3.74         3.34<												4.604
7         5.59         4.74         4.35         4.12         3.97         3.87         3.79         7         0.896         2.365         3.4           8         5.32         4.46         4.07         3.84         3.69         3.58         3.50         8         0.889         2.306         3.3           9         5.12         4.26         3.86         3.63         3.48         3.37         3.29         9         0.883         2.262         3.2           10         4.96         4.10         3.71         3.48         3.32         3.22         3.13         10         0.879         2.228         3.1           11         4.84         3.98         3.59         3.36         3.20         3.09         3.01         11         0.876         2.201         3.1           12         4.75         3.88         3.49         3.26         3.10         3.00         2.91         12         0.873         2.179         3.6           14         4.60         3.74         3.34         3.11         2.96         2.85         2.76         14         0.868         2.145         2.9           15         4.54         3.68         3.29<												4.032
8       5.32       4.46       4.07       3.84       3.69       3.58       3.50       8       0.889       2.306       3.2         9       5.12       4.26       3.86       3.63       3.48       3.37       3.29       9       0.883       2.262       3.2         10       4.96       4.10       3.71       3.48       3.32       3.22       3.13       10       0.879       2.228       3.1         11       4.84       3.98       3.59       3.36       3.20       3.09       3.01       11       0.876       2.201       3.1         12       4.75       3.88       3.49       3.26       3.10       3.00       2.91       12       0.873       2.179       3.6         13       4.67       3.80       3.41       3.18       3.02       2.92       2.83       13       0.870       2.160       3.6         14       4.60       3.74       3.34       3.11       2.96       2.85       2.76       14       0.868       2.145       2.9         15       4.54       3.68       3.29       3.06       2.90       2.79       2.71       15       0.866       2.131       2.9												3.707
9       5.12       4.26       3.86       3.63       3.48       3.37       3.29       9       0.883       2.262       3.2         10       4.96       4.10       3.71       3.48       3.32       3.22       3.13       10       0.879       2.228       3.1         11       4.84       3.98       3.59       3.36       3.20       3.09       3.01       11       0.876       2.201       3.1         12       4.75       3.88       3.49       3.26       3.10       3.00       2.91       12       0.873       2.179       3.6         13       4.67       3.80       3.41       3.18       3.02       2.92       2.83       13       0.870       2.160       3.6         14       4.60       3.74       3.34       3.11       2.96       2.85       2.76       14       0.868       2.145       2.9         15       4.54       3.68       3.29       3.06       2.90       2.79       2.71       15       0.866       2.131       2.9         16       4.49       3.63       3.24       3.01       2.85       2.74       2.66       17       0.863       2.110       2.8 <td></td> <td>3.499</td>												3.499
10         4.96         4.10         3.71         3.48         3.32         3.22         3.13         10         0.879         2.228         3.1           11         4.84         3.98         3.59         3.36         3.20         3.09         3.01         11         0.876         2.201         3.1           12         4.75         3.88         3.49         3.26         3.10         3.00         2.91         12         0.873         2.179         3.0           13         4.67         3.80         3.41         3.18         3.02         2.92         2.83         13         0.870         2.160         3.0           14         4.60         3.74         3.34         3.11         2.96         2.85         2.76         14         0.868         2.145         2.9           15         4.54         3.68         3.29         3.06         2.90         2.79         2.71         15         0.866         2.131         2.9           16         4.49         3.63         3.24         3.01         2.85         2.74         2.66         16         0.865         2.120         2.9           17         4.45         3.59 <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>3.355</td></td<>												3.355
11       4.84       3.98       3.59       3.36       3.20       3.09       3.01       11       0.876       2.201       3.1         12       4.75       3.88       3.49       3.26       3.10       3.00       2.91       12       0.873       2.179       3.6         13       4.67       3.80       3.41       3.18       3.02       2.92       2.83       13       0.870       2.160       3.6         14       4.60       3.74       3.34       3.11       2.96       2.85       2.76       14       0.868       2.145       2.5         15       4.54       3.68       3.29       3.06       2.90       2.79       2.71       15       0.866       2.131       2.9         16       4.49       3.63       3.24       3.01       2.85       2.74       2.66       16       0.865       2.120       2.9         17       4.45       3.59       3.20       2.96       2.81       2.70       2.61       17       0.863       2.110       2.8         18       4.41       3.55       3.16       2.93       2.77       2.66       2.58       18       0.862       2.101       2.8 </td <td>9</td> <td>5.12</td> <td>4.26</td> <td>3.86</td> <td>3.63</td> <td>3.48</td> <td>3.37</td> <td>3.29</td> <td>9</td> <td>0.883</td> <td>2.262</td> <td>3.250</td>	9	5.12	4.26	3.86	3.63	3.48	3.37	3.29	9	0.883	2.262	3.250
12       4.75       3.88       3.49       3.26       3.10       3.00       2.91       12       0.873       2.179       3.0         13       4.67       3.80       3.41       3.18       3.02       2.92       2.83       13       0.870       2.160       3.0         14       4.60       3.74       3.34       3.11       2.96       2.85       2.76       14       0.868       2.145       2.9         15       4.54       3.68       3.29       3.06       2.90       2.79       2.71       15       0.866       2.131       2.9         16       4.49       3.63       3.24       3.01       2.85       2.74       2.66       16       0.865       2.120       2.9         17       4.45       3.59       3.20       2.96       2.81       2.70       2.61       17       0.863       2.110       2.8         18       4.41       3.55       3.16       2.93       2.77       2.66       2.58       18       0.862       2.101       2.8         20       4.35       3.49       3.10       2.87       2.71       2.60       2.51       20       0.860       2.086       2.8 </td <td>10</td> <td>4.96</td> <td>4.10</td> <td>3.71</td> <td>3.48</td> <td>3.32</td> <td>3.22</td> <td>3.13</td> <td>10</td> <td>0.879</td> <td>2.228</td> <td>3.169</td>	10	4.96	4.10	3.71	3.48	3.32	3.22	3.13	10	0.879	2.228	3.169
13       4.67       3.80       3.41       3.18       3.02       2.92       2.83       13       0.870       2.160       3.0         14       4.60       3.74       3.34       3.11       2.96       2.85       2.76       14       0.868       2.145       2.9         15       4.54       3.68       3.29       3.06       2.90       2.79       2.71       15       0.866       2.131       2.9         16       4.49       3.63       3.24       3.01       2.85       2.74       2.66       16       0.865       2.120       2.9         17       4.45       3.59       3.20       2.96       2.81       2.70       2.61       17       0.863       2.110       2.8         18       4.41       3.55       3.16       2.93       2.77       2.66       2.58       18       0.862       2.101       2.8         19       4.38       3.52       3.13       2.90       2.74       2.63       2.54       19       0.861       2.093       2.8         20       4.35       3.49       3.10       2.87       2.71       2.60       2.51       20       0.860       2.086       2.8 </td <td>11</td> <td>4.84</td> <td>3.98</td> <td>3.59</td> <td>3.36</td> <td>3.20</td> <td>3.09</td> <td>3.01</td> <td>11</td> <td>0.876</td> <td>2.201</td> <td>3.106</td>	11	4.84	3.98	3.59	3.36	3.20	3.09	3.01	11	0.876	2.201	3.106
14       4.60       3.74       3.34       3.11       2.96       2.85       2.76       14       0.868       2.145       2.9         15       4.54       3.68       3.29       3.06       2.90       2.79       2.71       15       0.866       2.131       2.9         16       4.49       3.63       3.24       3.01       2.85       2.74       2.66       16       0.865       2.120       2.9         17       4.45       3.59       3.20       2.96       2.81       2.70       2.61       17       0.863       2.110       2.8         18       4.41       3.55       3.16       2.93       2.77       2.66       2.58       18       0.862       2.101       2.8         19       4.38       3.52       3.13       2.90       2.74       2.63       2.54       19       0.861       2.093       2.8         20       4.35       3.49       3.10       2.87       2.71       2.60       2.51       20       0.860       2.086       2.8         21       4.32       3.47       3.07       2.84       2.68       2.57       2.49       21       0.859       2.080       2.8 </td <td>12</td> <td>4.75</td> <td>3.88</td> <td>3.49</td> <td>3.26</td> <td>3.10</td> <td>3.00</td> <td>2.91</td> <td>12</td> <td>0.873</td> <td>2.179</td> <td>3.055</td>	12	4.75	3.88	3.49	3.26	3.10	3.00	2.91	12	0.873	2.179	3.055
15       4.54       3.68       3.29       3.06       2.90       2.79       2.71       15       0.866       2.131       2.9         16       4.49       3.63       3.24       3.01       2.85       2.74       2.66       16       0.865       2.120       2.9         17       4.45       3.59       3.20       2.96       2.81       2.70       2.61       17       0.863       2.110       2.8         18       4.41       3.55       3.16       2.93       2.77       2.66       2.58       18       0.862       2.101       2.8         19       4.38       3.52       3.13       2.90       2.74       2.63       2.54       19       0.861       2.093       2.8         20       4.35       3.49       3.10       2.87       2.71       2.60       2.51       20       0.860       2.086       2.8         21       4.32       3.47       3.07       2.84       2.68       2.57       2.49       21       0.859       2.080       2.8         23       4.28       3.42       3.03       2.80       2.64       2.53       2.44       23       0.858       2.069       2.8 </td <td>13</td> <td>4.67</td> <td>3.80</td> <td>3.41</td> <td>3.18</td> <td>3.02</td> <td>2.92</td> <td>2.83</td> <td>13</td> <td>0.870</td> <td>2.160</td> <td>3.012</td>	13	4.67	3.80	3.41	3.18	3.02	2.92	2.83	13	0.870	2.160	3.012
16       4.49       3.63       3.24       3.01       2.85       2.74       2.66       16       0.865       2.120       2.95         17       4.45       3.59       3.20       2.96       2.81       2.70       2.61       17       0.863       2.110       2.8         18       4.41       3.55       3.16       2.93       2.77       2.66       2.58       18       0.862       2.101       2.8         19       4.38       3.52       3.13       2.90       2.74       2.63       2.54       19       0.861       2.093       2.8         20       4.35       3.49       3.10       2.87       2.71       2.60       2.51       20       0.860       2.086       2.8         21       4.32       3.47       3.07       2.84       2.68       2.57       2.49       21       0.859       2.080       2.8         22       4.30       3.44       3.05       2.82       2.66       2.55       2.46       22       0.858       2.074       2.8         23       4.28       3.40       3.00       2.78       2.62       2.51       2.42       24       0.857       2.064       2.7<	14	4.60	3.74	3.34	3.11	2.96	2.85	2.76	14	0.868	2.145	2.977
17       4.45       3.59       3.20       2.96       2.81       2.70       2.61       17       0.863       2.110       2.8         18       4.41       3.55       3.16       2.93       2.77       2.66       2.58       18       0.862       2.101       2.8         19       4.38       3.52       3.13       2.90       2.74       2.63       2.54       19       0.861       2.093       2.8         20       4.35       3.49       3.10       2.87       2.71       2.60       2.51       20       0.860       2.086       2.8         21       4.32       3.47       3.07       2.84       2.68       2.57       2.49       21       0.859       2.080       2.8         22       4.30       3.44       3.05       2.82       2.66       2.55       2.46       22       0.858       2.074       2.8         23       4.28       3.42       3.03       2.80       2.64       2.53       2.44       23       0.858       2.069       2.8         24       4.26       3.40       3.00       2.78       2.62       2.51       2.42       24       0.857       2.064       2.7 </td <td>15</td> <td>4.54</td> <td>3.68</td> <td>3.29</td> <td>3.06</td> <td>2.90</td> <td>2.79</td> <td>2.71</td> <td>15</td> <td>0.866</td> <td>2.131</td> <td>2.947</td>	15	4.54	3.68	3.29	3.06	2.90	2.79	2.71	15	0.866	2.131	2.947
18       4.41       3.55       3.16       2.93       2.77       2.66       2.58       18       0.862       2.101       2.8         19       4.38       3.52       3.13       2.90       2.74       2.63       2.54       19       0.861       2.093       2.8         20       4.35       3.49       3.10       2.87       2.71       2.60       2.51       20       0.860       2.086       2.8         21       4.32       3.47       3.07       2.84       2.68       2.57       2.49       21       0.859       2.080       2.8         22       4.30       3.44       3.05       2.82       2.66       2.55       2.46       22       0.858       2.074       2.8         23       4.28       3.42       3.03       2.80       2.64       2.53       2.44       23       0.858       2.069       2.8         24       4.26       3.40       3.00       2.78       2.62       2.51       2.42       24       0.857       2.064       2.7         25       4.24       3.38       2.99       2.76       2.60       2.49       2.40       25       0.856       2.052       2.7 </td <td>16</td> <td>4.49</td> <td>3.63</td> <td>3.24</td> <td>3.01</td> <td>2.85</td> <td>2.74</td> <td>2.66</td> <td>16</td> <td>0.865</td> <td>2.120</td> <td>2.921</td>	16	4.49	3.63	3.24	3.01	2.85	2.74	2.66	16	0.865	2.120	2.921
19       4.38       3.52       3.13       2.90       2.74       2.63       2.54       19       0.861       2.093       2.8         20       4.35       3.49       3.10       2.87       2.71       2.60       2.51       20       0.860       2.086       2.8         21       4.32       3.47       3.07       2.84       2.68       2.57       2.49       21       0.859       2.080       2.8         22       4.30       3.44       3.05       2.82       2.66       2.55       2.46       22       0.858       2.074       2.8         23       4.28       3.42       3.03       2.80       2.64       2.53       2.44       23       0.858       2.069       2.8         24       4.26       3.40       3.00       2.78       2.62       2.51       2.42       24       0.857       2.064       2.7         25       4.24       3.38       2.99       2.76       2.60       2.49       2.40       25       0.856       2.056       2.7         26       27       0.855       2.048       2.7       2.8       2.8       0.855       2.048       2.7         28	17	4.45	3.59	3.20	2.96	2.81	2.70	2.61	17	0.863	2.110	2.898
20       4.35       3.49       3.10       2.87       2.71       2.60       2.51       20       0.860       2.086       2.8         21       4.32       3.47       3.07       2.84       2.68       2.57       2.49       21       0.859       2.080       2.8         22       4.30       3.44       3.05       2.82       2.66       2.55       2.46       22       0.858       2.074       2.8         23       4.28       3.42       3.03       2.80       2.64       2.53       2.44       23       0.858       2.069       2.8         24       4.26       3.40       3.00       2.78       2.62       2.51       2.42       24       0.857       2.064       2.7         25       4.24       3.38       2.99       2.76       2.60       2.49       2.40       25       0.856       2.056       2.7         26       27       2.855       2.048       2.7       2.855       2.048       2.7         28       0.855       2.048       2.7       2.8       2.8       2.8       2.8	18	4.41	3.55	3.16	2.93	2.77	2.66	2.58	18	0.862	2.101	2.878
21       4.32       3.47       3.07       2.84       2.68       2.57       2.49       21       0.859       2.080       2.8         22       4.30       3.44       3.05       2.82       2.66       2.55       2.46       22       0.858       2.074       2.8         23       4.28       3.42       3.03       2.80       2.64       2.53       2.44       23       0.858       2.069       2.8         24       4.26       3.40       3.00       2.78       2.62       2.51       2.42       24       0.857       2.064       2.7         25       4.24       3.38       2.99       2.76       2.60       2.49       2.40       25       0.856       2.050       2.7         26       27       0.855       2.052       2.7         28       0.855       2.048       2.7	19	4.38	3.52	3.13	2.90	2.74	2.63	2.54	19	0.861	2.093	2.861
22       4.30       3.44       3.05       2.82       2.66       2.55       2.46       22       0.858       2.074       2.8         23       4.28       3.42       3.03       2.80       2.64       2.53       2.44       23       0.858       2.069       2.8         24       4.26       3.40       3.00       2.78       2.62       2.51       2.42       24       0.857       2.064       2.7         25       4.24       3.38       2.99       2.76       2.60       2.49       2.40       25       0.856       2.060       2.7         26       27       0.855       2.052       2.7         28       0.855       2.048       2.7	20	4.35	3.49	3.10	2.87	2.71	2.60	2.51	20	0.860	2.086	2.845
23       4.28       3.42       3.03       2.80       2.64       2.53       2.44       23       0.858       2.069       2.8         24       4.26       3.40       3.00       2.78       2.62       2.51       2.42       24       0.857       2.064       2.7         25       4.24       3.38       2.99       2.76       2.60       2.49       2.40       25       0.856       2.060       2.7         26       27       0.855       2.056       2.7       2.052       2.7         28       0.855       2.048       2.7	21	4.32	3.47	3.07	2.84	2.68	2.57	2.49	21	0.859	2.080	2.831
24     4.26     3.40     3.00     2.78     2.62     2.51     2.42     24     0.857     2.064     2.7       25     4.24     3.38     2.99     2.76     2.60     2.49     2.40     25     0.856     2.060     2.7       26     27     0.855     2.056     2.7       28     0.855     2.048     2.7	22	4.30	3.44	3.05	2.82	2.66	2.55	2.46	22	0.858	2.074	2.819
25     4.24     3.38     2.99     2.76     2.60     2.49     2.40     25     0.856     2.060     2.7       26     27     0.855     2.056     2.7       28     28     0.855     2.048     2.7	23	4.28	3.42	3.03	2.80	2.64	2.53	2.44	23	0.858	2.069	2.807
26     26     0.856     2.056     2.7       27     0.855     2.052     2.7       28     0.855     2.048     2.7	24	4.26	3.40	3.00	2.78	2.62	2.51	2.42	24	0.857	2.064	2.797
27     0.855     2.052     2.7       28     0.855     2.048     2.7	25	4.24	3.38	2.99	2.76	2.60	2.49	2.40	25	0.856	2.060	2.787
28 0.855 2.048 2.7	26								26	0.856	2.056	2.779
	27								27	0.855	2.052	2.771
29 0.854 2.045 2.3	28								28	0.855	2.048	2.763
	29								29	0.854	2.045	2.756
	30								30	0.854	2.042	2.750